

(12) UK Patent Application (19) GB (11) 2 298 899 (13) A

(43) Date of A Publication 18.09.1996

(21) Application No 9605415.0

(22) Date of Filing 14.03.1996

(30) Priority Data

(31) 19509604

(32) 16.03.1995

(33) DE

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(51) INT CL⁶

F01L 31/22 1/18

(52) UK CL (Edition O)

**F1B BBC BB130 B2P1A4 B2P1A5 B2P2K1 B2P2M2
B2P2Q**

(56) Documents Cited

US 5373818 A

(58) Field of Search

UK CL (Edition O) F1B

INT CL⁶ F01L 13/00 31/22

(54) I.c. engine valve gear

(57) A rocker 5 operating inlet valves 3 has a roller (7, Figs. 1 and 3) engaged by a rocker 8 guided on a shaft 9' between eccentrics 9. Cams 10 engage rollers 12 on the rocker 8 which is biased to engage the cams and the eccentrics 9 by a spring. Angular adjustment of the shaft 9' varies the valve motion provided by the cams 10.

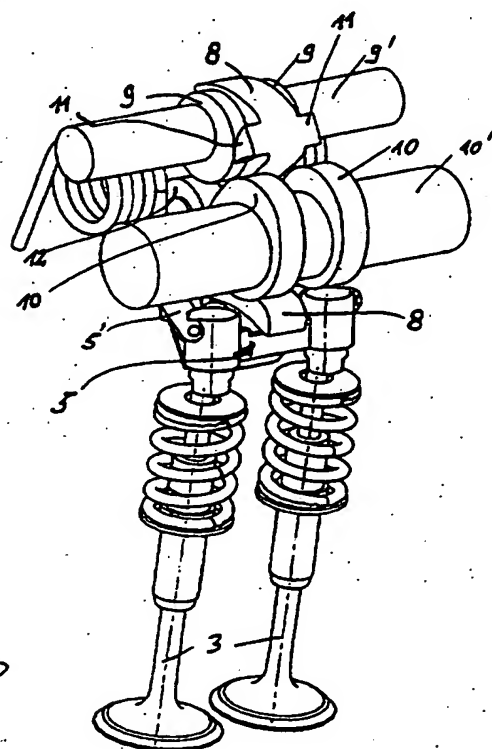


Fig. 2

GB 2 298 899 A

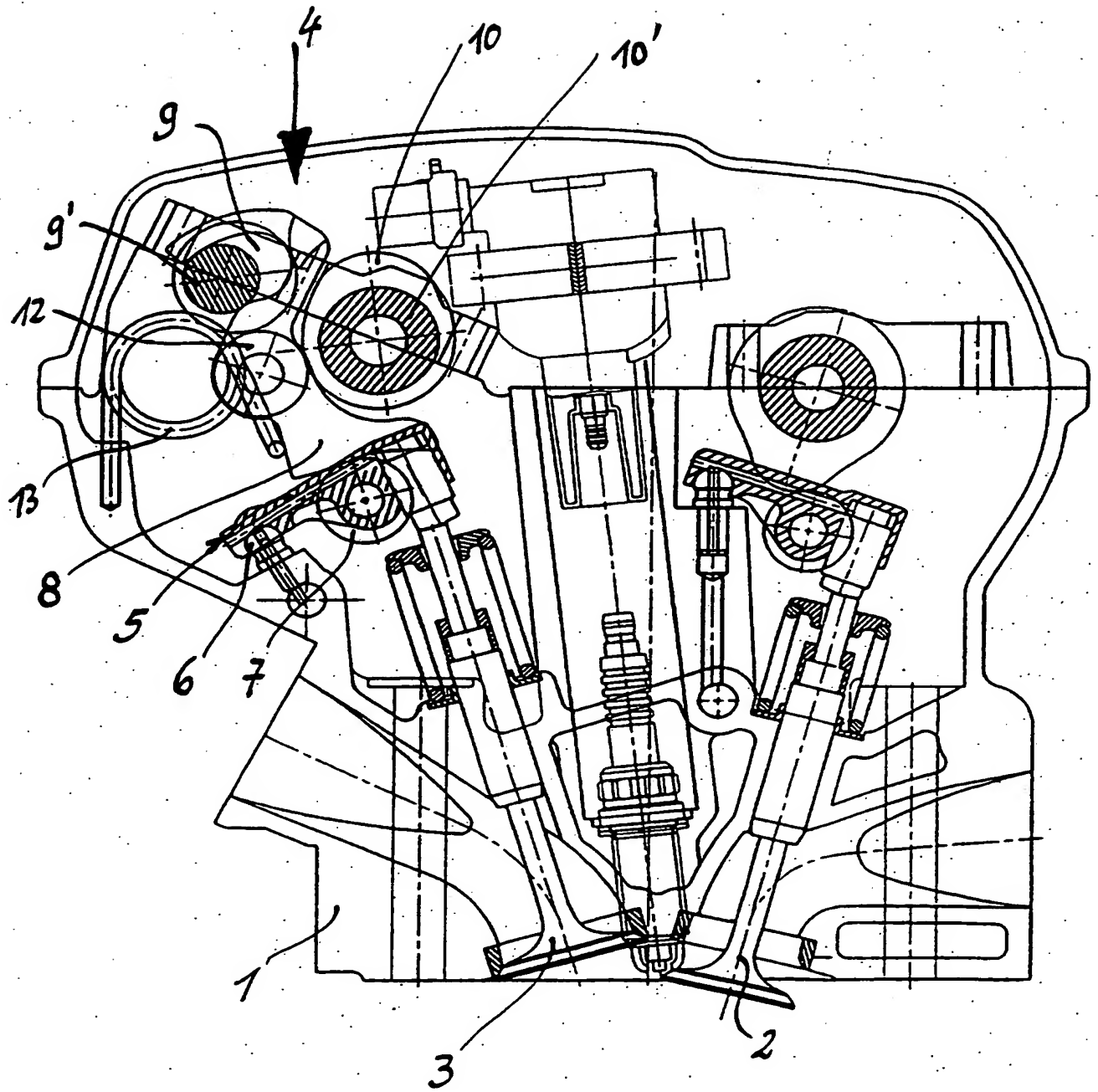
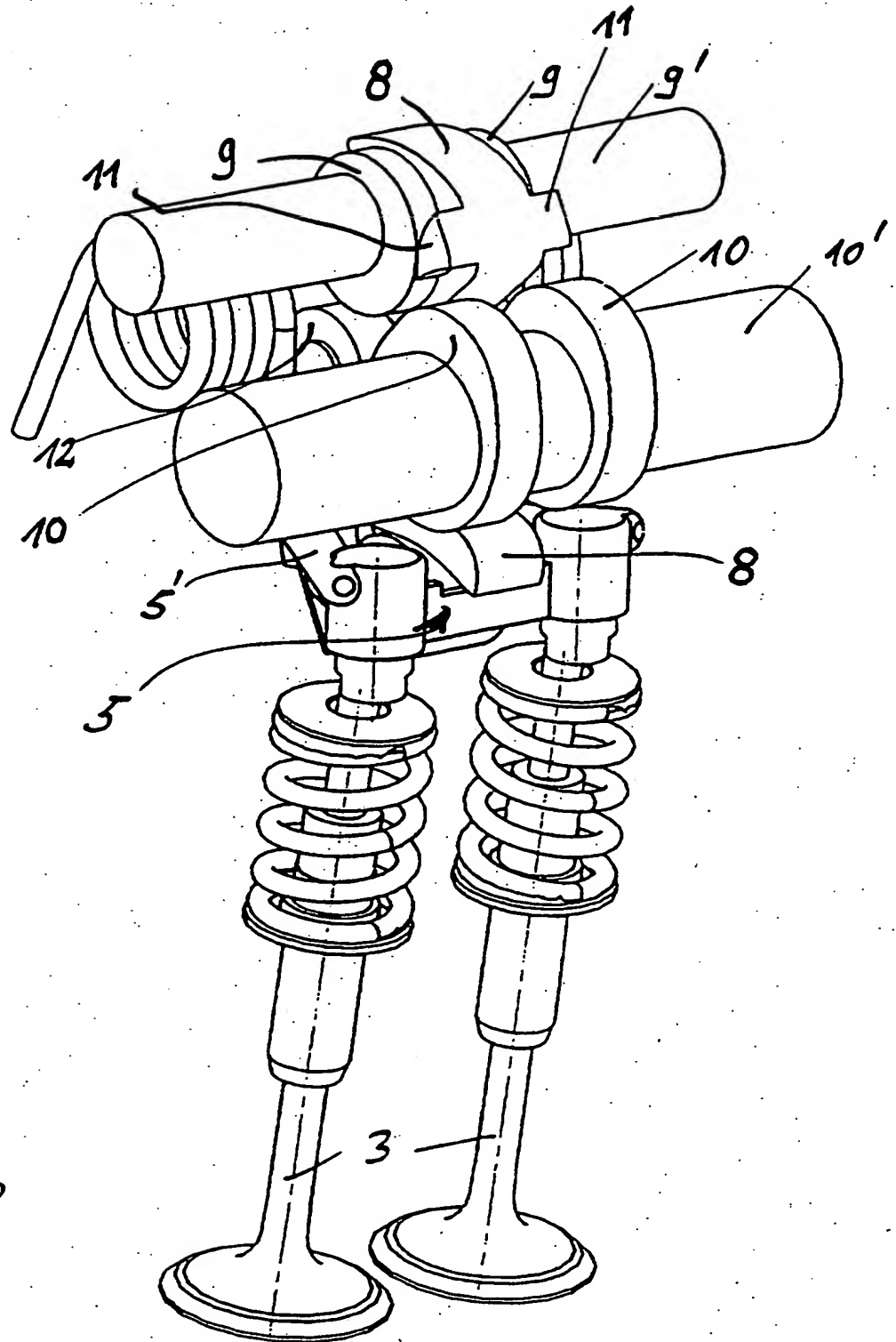
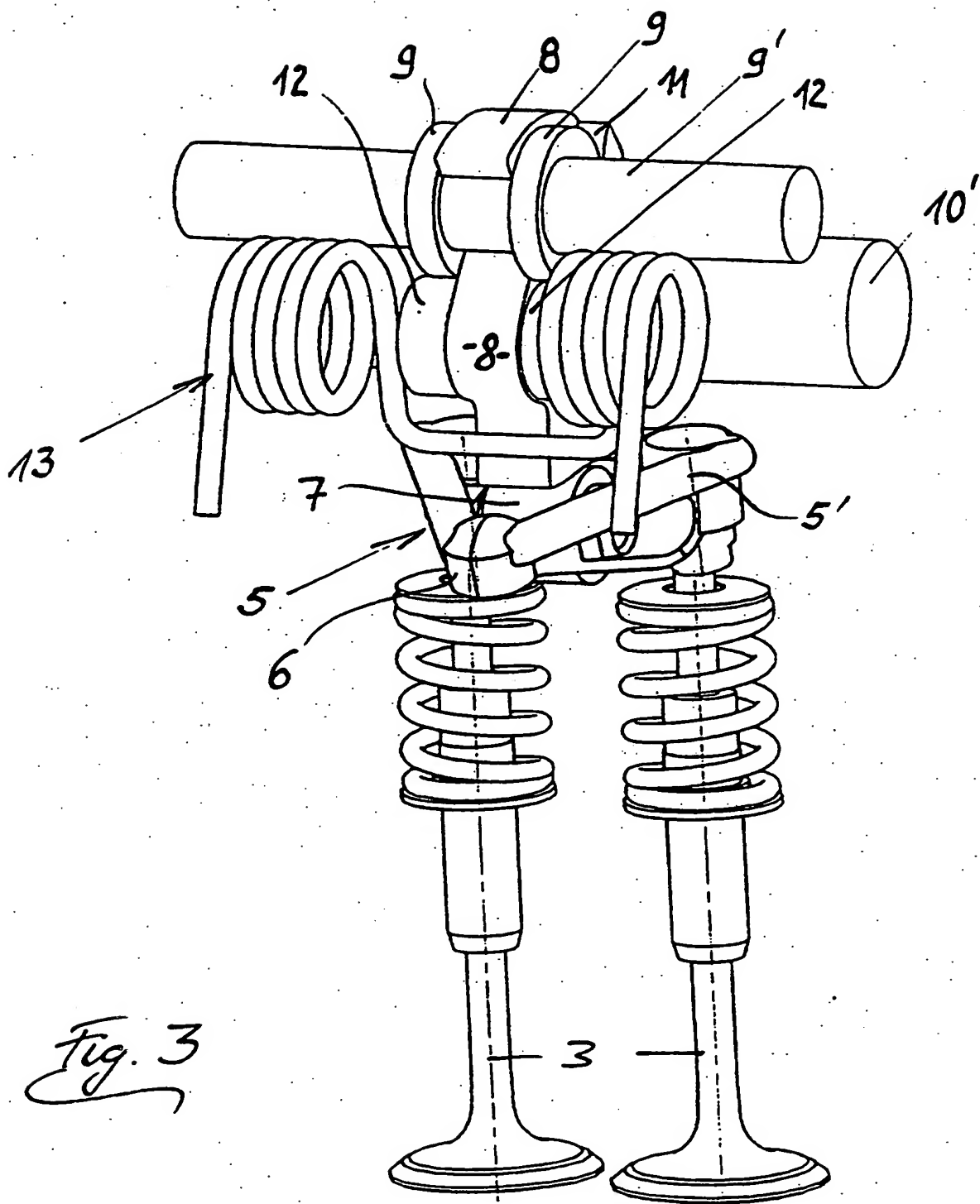


Fig. 1

*Fig. 2*

*Fig. 3*

Valve drive for an internal combustion engine

The present invention relates to a valve drive
5 for an internal combustion engine comprising a second
rocker arm operating on a lifting valve, a first rocker arm
associated with the second rocker arm, a cam associated
with the first rocker arm and an adjustable eccentric,
which is arranged on an eccentric shaft, whereby the rocker
10 arms, the cam and the eccentric operate together in order
that for different positions of the eccentric, different
valve lifting sequences are achieved by the action of the
cam.

A valve drive of this construction is proposed in
15 DE-A-43 26 331. The aim of the present invention is to
provide a simple construction for such a valve drive.

Accordingly, the present invention is directed to
a valve drive as described in the opening paragraph of the
present specification which comprises second rocker arm
20 operating on the lifting valve, a first rocker arm
associated with the second rocker arm, a cam associated
with the first rocker arm and an adjustable eccentric,
which is arranged on an eccentric shaft, whereby the rocker
arms, the cam and the eccentric operate together in order
25 that for different positions of the eccentric, different
valve lifting sequences are achieved by the action of the
cam, in which the first rocker arm, supported on the
eccentric, is guided by the eccentric shaft.

Preferably, the first rocker arm is guided by the

eccentric shaft and reaches round a section of the eccentric shaft with its free end.

Advantageously, eccentrics are arranged on both sides of the section enclosed by the first rocker arm, on which eccentrics the first rocker arm supports itself by means of lugs which are provided on its side faces.

In a preferred embodiment the first rocker arm bearing on the eccentric is controlled by the cam and thereby activates the second rocker arm which operates on the lifting valve.

Preferably, the first rocker arm controlled by the cam carries a roller on each of its side faces on each of which a cam operates.

Advantageously, the second rocker arm is formed in a forked shape and operates two parallel working valves of an internal combustion engine cylinder.

In a preferred embodiment, a roller is positioned between the two fork arms of the second rocker arm, on which roller the first rocker arm operates.

Preferably, a spring element formed as a torsion cylindrical helical coiled spring supports the positioning of the first rocker arm.

An example of a valve drive for an internal combustion engine made in accordance with the present invention, will now be described with reference to the accompanying drawings, in which;

Figure 1 shows a cross-sectional view of an internal combustion engine cylinder head with a valve drive; Figure 2 shows a perspective view of the

valve drive; and

Figure 3 shows a perspective view of the drive in Figure 2 from the other side.

5 In a cylinder head 1 in an internal combustion engine, an inlet valve 3 is positioned alongside an exhaust valve 2, both of which are operated by a valve drive mechanism 4.

10 In detail, a so-called second rocker arm 5, which is positioned in a ball socket 6 and carries a roller 7 on which a so-called first rocker 8 operates, acts on the free end of the valve 3.

15 The first rocker arm 8 is supported at its end opposite to rocker arm 5 by an eccentric 9. A cam 10 also operates on the first rocker arm 8. At a defined position of the eccentric 9 the valve 3 is opened as normal in accordance with a defined valve lifting sequence. During this the cam 10, rotating on its axis, controls the first rocker arm 8 in a certain manner such that this controlling movement is transmitted via the roller 7 to the second rocker arm 5 and from this to the valve 3. If the eccentric 9 now takes up a different position, then the position of the first rocker arm 8 changes, so that a different valve lifting sequence comes about for the valve 3.

25 The internal combustion engine shown in the accompanying drawings, with cylinder head 1 is an in-line internal combustion engine, in which several cams 10 are arranged on a common cam shaft 10' for the several internal combustion engine cylinders which are arranged one behind

the other. In a similar manner several eccentrics 9 are arranged on a common eccentric shaft 9'. Whilst the second rocker arm 5 is positioned in the ball socket 6, a suitable positioning or control must be provided for the first rocker arm 8. In the construction described herein the first rocker arm 8 is controlled by the eccentric shaft 9'. This can best be seen in the illustrations in Figures 2 and 3, which show that the free end of this first rocker arm 8 partially reaches round a segment of the eccentric shaft 9'. Preferably the first rocker arm 8 is guided by the eccentric shaft 9', and no separate component is required for guiding; rather it is possible for the first rocker arm 8 to fall back on the eccentric shaft 9', which is available in any case because of there being several eccentrics 9.

Similarly, it can be seen from Figures 2 and 3, that there are eccentrics 9 arranged on both sides of the segment of the eccentric shaft 9' enclosed by the first rocker arm 8, against which the first rocker arm 8 is supported using the protrusions or lugs 11 which are provided on the side edges of the first rocker arm 8. With an equal distribution of forces, this arrangement leads to an extremely stable positioning and guidance of the first rocker arm 8 by the eccentric shaft 9' and the eccentrics 9. In a comparable fashion two cams 10 are provided which act on the first rocker arm 8, and which must obviously - as must the two eccentrics 9 - be of the same configuration. The two cams 10 operate via rollers 12 on the first rocker arm 8, therefore, the first rocker arm 8

carries on both sides a roller 12 of this construction.

The valve drive described herein is especially suited to the operation of two parallel working lifting valves 3 of an internal combustion engine cylinder, in coordination with the available building space. The second rocker arm 5, which is operated by the first rocker arm 8, can (as shown) be formed as a fork and it can then operate upon a lifting valve 3 with each of its fork arms 5'. With the advantage that the roller 7, on which the first rocker arm travels, is positioned between the two fork arms 5'.

Furthermore, a spring element 13, formed as a torsion cylindrical helical coiled spring, can be seen in all the Figures, which supports the positioning of the first rocker arm 8. Thus, the spring element 13 ensures that the first rocker arm 8 is, on the one hand pressed against the cam 10 by its rollers 12 and on the other hand, at the end opposite to the second rocker arm 5, is guided by the eccentric shaft 9', and supports itself at this end against the two eccentrics 9.

Claims

1. A valve drive for an internal combustion engine comprising a second rocker arm operating on a lifting
5 valve, a first rocker arm associated with the second rocker arm, a cam associated with the first rocker arm and an adjustable eccentric, which is arranged on an eccentric shaft, whereby the rocker arms, the cam and the eccentric operate together in order that for different positions of
10 the eccentric, different valve lifting sequences are achieved by the action of the cam, in which the first rocker arm, supported on the eccentric, is guided by the eccentric shaft.
2. A valve drive according to Claim 1, in which the
15 first rocker arm is guided by the eccentric shaft and reaches round a section of the eccentric shaft with its free end.
3. A valve drive according to Claim 2, in which
20 eccentrics are arranged on both sides of the section enclosed by the first rocker arm, on which eccentrics the first rocker arm supports itself by means of protrusions which are provided on its side faces.
4. A valve drive according to any preceding Claim,
25 in which the first rocker arm bearing on the eccentric is controlled by the cam and thereby activates the second rocker arm which operates on the lifting valve.
5. A valve drive according to any preceding Claim,
in which the first rocker arm controlled by the cam carries
a roller on each of its side faces on each of which a cam

operates.

5 6. A valve drive according to any preceding Claim, in which the second rocker arm is formed in a forked shape and operates two parallel working valves of an internal combustion engine cylinder.

7. A valve drive according to any preceding Claim, in which a roller is positioned between the two fork arms of the second rocker arm, on which roller the first rocker arm operates.

10 8. A valve drive according to any preceding Claim, in which a spring element formed as a torsion cylindrical helical coiled spring supports the positioning of the first rocker arm.

15 9. A valve drive for an internal combustion engine substantially as described herein with reference to the accompanying drawings.



Application No: GB 9605415.0
Claims searched: 1-9

Examiner: Roger Dennis
Date of search: 1 May 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): F1B

Int CI (Ed.6): F01L 13/00 31/22

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5373818 (B.M.W.)	1

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
& Member of the same patent family

A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.